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(54) CADRE DE PORTE MOULE ET METHODE
(54) MOLDED DOOR FRAME AND METHOD

(57)

Disclosed is a utilization of two mating frames or halves for a door, defining an extended cavity therebetween bounded by a circumambient or outer surrounding peripheral wall formation, and where a window opening is located therewithin bounded by a circumambient or inner surrounding peripheral wall formation, the outer wall and inner wall formations constituting an outer and inner "dam" respectively, which arrangement channels the flow of a suitable expanding foam material, injected through an access port located in the outer dam, throughout the cavity and limits its escape so as to establish a fully expanded rigidified foam body core adhered, when cured, to the inner surfaces of the mating frames or halves; and an optimum structure wherein the two mating frames or halves are secured together only by the adhered rigidified foam body core, which provides insulation, and reinforced by adherence to the inner surfaces the core imparts substantial structural strength to the door.

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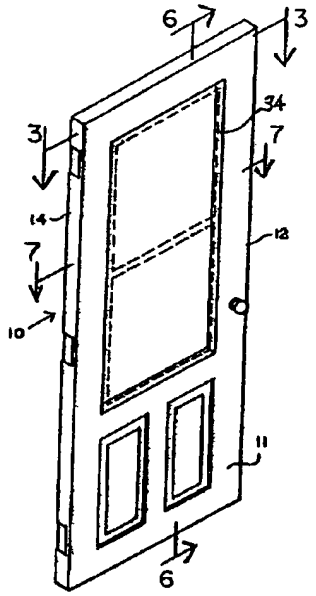
(54) **CADRE DE PORTE MOULE ET METHODE**
(54) **MOLDED DOOR FRAME AND METHOD**



(57) Disclosed is a utilization of two mating frames or halves for a door, defining an extended cavity therebetween bounded by a circumambient or outer surrounding peripheral wall formation, and where a window opening is located therewithin bounded by a circumambient or inner surrounding peripheral wall formation, the outer wall and inner wall formations constituting an outer and inner "dam" respectively, which arrangement channels the flow of a suitable expanding foam material, injected through an access port located in the outer dam, throughout the cavity and limits its escape so as to establish a fully expanded rigidified foam body core adhered, when cured, to the inner surfaces of the mating frames or halves; and an optimum structure wherein the two mating frames or halves are secured together only by the adhered rigidified foam body core, which provides insulation, and reinforced by adherence to the inner surfaces the core imparts substantial structural strength to the door.

ABSTRACT OF THE DISCLOSURE

Disclosed is a utilization of two mating frames or halves for a door, defining an extended cavity therebetween bounded by a circumambient or outer surrounding peripheral wall formation, and where a window opening is located therewithin bounded by a circumambient or inner surrounding peripheral wall formation, the outer wall and inner wall formations constituting an outer and inner "dam" respectively, which arrangement channels the flow of a suitable expanding foam material, injected through an access port located in the outer dam, throughout the cavity and limits its escape so as to establish a fully expanded rigidified foam body core adhered, when cured, to the inner surfaces of the mating frames or halves; and an optimum structure wherein the two mating frames or halves are secured together only by the adhered rigidified foam body core, which provides insulation, and reinforced by adherence to the inner surfaces the core imparts substantial structural strength to the door.

Field of the Invention

The present invention relates to doors, and primarily storm doors although in a closed front configuration, the same can be used for a primary door or an interior door.

Background of the Invention

Doors of the molded storm door type are exemplified by Applicant's U.S. Patent 4,311,183. In particular, Applicant's U.S. Patent 4,311,183 relating to a storm door which self stores the screen and the window portion, and is formed of two molded halves, is the principal prior art. It has enjoyed significant commercial success. However, for a lower priced door having dimensional stability, and the ability for presenting an opening which can house a screen, or a window, either removably or semi-permanently, some of the elements of the prior art door are not required. A lower effective cost can be achieved when the door is formed of two mating frames or halves, and secured or joined together without screws or other fasteners or by auxiliary equipment.

Summary of the Invention

The present invention is based upon the utilization of two opposed interengaged mating frames or halves for a door which are configured to define a hollow interior or cavity therebetween, the circumambient or surrounding peripheral outer wall thereof, and where a window opening within the door is provided the circumambient or surrounding peripheral inner wall thereof, each constituting a "dam" assembly, which arrangement channels and substantially precludes the escape of a selected foaming material such as a two-part urethane system injected into the cavity to fill

same and establish, upon curing, a rigidified core adhered to the entire inner surfaces or skin of both frames or halves.

The expanding foam from a two-part urethane system is injected through a port or ports located in the circumambient or surrounding peripheral outer wall formation, the outer dam. In the optimal form the mating frames or halves are secured together only by the body of rigidified foam which is adhered to the inner surfaces or skins of the mating frames or halves.

The foamed body provides insulation. Additionally, the foamed body reinforced by the adherence to the inner surfaces of the frames or halves imparts substantial structural strength to the door enhancing the monocoque effect thereof.

In view of the foregoing, it is a principal object of the present invention to provide an improved highly cost effective, yet durable door from two mating frames or halves which positioned opposite each other define an in-place mold for a selected foam which when injected interiorly to fill the cavity, and cured, adheres the two frames or halves together.

A further object of the present invention is to provide a door which is dimensionally stable, and adaptable to a wide variety of finished configurations, including providing a selected opening within the mating frames or halves to accommodate a wide variety of window, screen and other auxiliary mountings.

Yet another object of the invention is to provide a cost-effective door with the foregoing advantages which has the security aspect of not readily permitting one frame or half to be removed from the other without destroying the entire door, so that with a

secure latching mechanism and hinge assembly a measure of increased security against unauthorized entry is achieved.

Description of the Illustrative Drawings

Further objects and advantages of the present invention will become apparent as the following description of illustrative embodiments proceed, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view of a door having a window/screen opening illustrative of the present invention;

FIG. 2 is an alternative embodiment of the subject door with a full view opening;

FIG. 3 is a partially broken transverse sectional view of the door taken along section line 3-3 of FIG. 1;

FIG. 4 is a perspective view of the outer frame or half of the subject door of FIG. 1;

FIG. 5 is a perspective view of the inner frame or half of the subject door of FIG. 1;

FIG. 6 is a vertical transverse sectional view of the door taken along section line 6-6 of FIG. 1;

FIG. 7 is an alternative embodiment of a dam assembly for the mating frames or halves taken along section line 7-7 of FIG. 1;

FIG. 8 is an alternative embodiment of the "dam" assembly shown in FIG. 7 also taken generally along section line 7-7 of FIG. 1;

FIG. 9 is yet another alternative embodiment of the "dam" assembly of mating frames or halves but also showing how an opposed

pin and socket connection may be employed for further securement of one half of the door to the other half;

FIG. 10 is a diagrammatic sectional view of the door showing the foam being injected so as to fill and effect securement upon being cured of the two frames or halves of the door together;

FIG. 11 is a perspective exploded view of an alternative embodiment door derived from preformed sheet metal;

FIG. 12 is a longitudinal sectional view of the two frames or halves of the door shown in FIG. 11, taken as they approach each other for securement;

FIG. 13 is yet another sequence to FIG. 12 showing the two frames or halves of the door joined together and interlocking at their ends;

FIG. 14 is a further embodiment of the door shown in FIGS. 11, 12, and 13, showing the two frames or halves joined together at both ends.

Description of Preferred Embodiments

The preferred embodiments of the present invention are illustrated in the drawings.

As will be seen in FIG. 1, the door 10, having a front 11 is made up of an outer frame or half 12 and an inner frame or half 14 as will be hereinafter described.

FIG. 2 discloses a door 10a similar to the structure of the door 10 of FIG. 1, but of a full window or screen opening variety.

As will be seen from FIG. 3 the mated frames or halves 12 and 14 of the door shown in FIG. 1 present a circumambient or surrounding outer peripheral wall formation or "dam" assembly 15.

Turning now to FIGs. 4 and 5 it will be seen that the surrounding outer peripheral wall formation or "dam assembly" 15 includes integral side wall portions 16, top wall portion 18 and a bottom wall portion 19 projecting inwardly of outer frame or half, 12 and integral side wall portions 26, top wall portion 28 and bottom wall portion 29 projecting outwardly of the inner frame or half 14.

When engaged in mating relationship the aforesaid side, top and bottom wall portions create or establish a continuous peripheral "dam" joint 25 therearound as illustrated in FIG. 3.

Window opening 20 with kick panel 21 therebelow of outer frame or half 12 and corresponding window opening 30 of inner frame or half 14 likewise have surrounding inner peripheral wall portions 32, 33, respectively, corresponding to the outer wall portions thereof, which when disposed in mating engagement establish a

circumambient or surrounding inner peripheral wall formation or "dam" assembly 34, as indicated in FIG. 1, with the requisite continuous inner peripheral "dam" joint like dam joint 25 of FIG. 3.

Further elements of a door, derived from frames or halves embodying the invention become apparent in FIG. 6.

In FIG. 6 it will be seen that the frames or halves of the door 35 take the form of outer panel 36 and inner panel 38, with a window opening 40 in outer panel 36, and a window opening 41 in inner panel 38.

In this embodiment the "dam" joints 43a, 43b, established by the inner peripheral wall formation 45 and the outer peripheral wall formation 42 are positioned adjacent the outer panel 36 of the door 35.

Further alternative surrounding outer peripheral and inner peripheral wall formations or "dam" assemblies are shown in FIGS. 7, 8 and 9.

Specifically in FIG. 7 the alternative "dam" joint 48a includes a peripheral wall portion 46 engaged in a recess presented by an upstanding boss formation 50 in the other frame or half. The opposed peripheral wall portions of the "dam" assembly are butt jointed as at 48b.

In FIG. 8 the alternative butt jointed wall portions of the "dam" assembly are at the exterior, with the interior wall or "dam" portion 51 engaged in a recess presented by a boss formation 52, the opposite as shown in FIG. 7.

Yet another joint is shown in FIG. 9 wherein the two wall or dam portions 52 and 54 are proportioned so as to overlap each other, but are reinforced in the overlapped relation by a projecting generally cylindrically shaped pin 55 which extends from one door panel for insertion into a cylindrically shaped recess or socket of a mounting boss 56 presented by the other door panel for mating interengagement.

Turning now to FIG. 10 the foaming procedure diagrammatically shown is generic to all alternative doors illustrated.

In FIG. 10 it will be seen that the surrounding outer peripheral wall formation or "dam" assembly in a lower portion of the door is provided with a nozzle port 58 to receive a source of foam material, which foam is injected or delivered into the hollow interior or cavity defined by the mated frames, halves or panels.

The door in an upper region of the outer peripheral wall formation or dam assembly is provided with a relief port 59 for the controlled escape of air and foam as the cavity is filled.

Yet another door embodying the invention is shown in FIGS. 11 to 14.

In FIG. 11 the outer panel and inner panel of the door 60 are preformed from a suitable sheet of material to take upon the configurations illustrated.

Outer integral wall formations 61a, 61b extend throughout the periphery of the respective door panels, and comparable inner integral wall formations 64a, 64b extend throughout the periphery

of the window openings 62a, 62b to create or establish the respective "dam" assemblies.

In accordance with the method of the present invention, essentially generic to all aforesaid alternative embodiments the frames, halves or panels are first formed, inner and outer, to be matingly interengaged to define the hollow interior or inner cavity.

Essential in the formation of each frame, half or panel are the surrounding peripheral outer wall formations, and where a window opening is selected for the embodiment, the surrounding inner peripheral wall formations which establish the respective "dam" assemblies.

Once the two frames, halves or panels are mated the respective peripheral wall formations engage to define the continuous "dam" joints therearound and the hollow interior or inner cavity. Thereafter the cavity is filled by injecting, through a suitable opening in the outer peripheral wall formation or outer "dam" assembly at the bottom or at the top, a sufficient amount of foam to fill the entire cavity. Once the cavity is filled and the foam body rigidified upon curing it will be seen that the two frames, halves or panels are adhesively secured to each other through the foam body adhered throughout the opposed inner surfaces or "skins" to the frames, halves or panels to create an enhanced "monocoque" effect, the foam body or core integrated with the frames, halves or panels, and as a consequence a strong structural component is imparted to such door.

It will be understood that various changes in the details, materials and arrangements of parts which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A door frame having an inner panel and outer panel, each panel having a central essentially rectangular opening for a window, said door frame having side edges, a top edge, and bottom edge, said central opening having side edges, a top edge, and a bottom edge, all of said edges being integrally formed in said panels from which said edges extend from the panel, comprising:

- said outer edges forming a dam wall assembly surrounding the outer extremes of the door and the central opening edges forming, with the outer edges, an essentially continuous hollow inside of the door panels,

- all of said edges being formed as a unitary one piece molded extension from the panels,

- each of said edges engaging an opposed edge engaging means,

- the edges of the door also serving as the dam wall assembly in the absence of secondary stiles, rails, or other independent elements inserted interiorly of the essentially continuous rectilinear dammed hollow space interiorly of the door,

- and a foamed in place interior essentially filling the hollow space defined by the edges,

whereby the finished door has a foamed in place core to fill the hollow space, add to structural integrity, enhance the monocoque effect of the overall door structure, and adhere the inner and outer skin to each other without the use of secondary mechanical

assembly steps in the formation and filling of the interior hollow space.

2. In the door according to Claim 1,

- outer and inner extensions into the window area to define opposed framing borders for receiving the window.

3. In the door according to Claim 1,

- said dam wall portions extending from both the outer skin and the inner skin to overlappingly engage the opposed wall portions.

4. A door having an outer panel and an inner panel, each panel having a central opening for a window, said panels defining a door frame having side edges, a top edge, and bottom edge, said central opening having side edges, a top edge, and a bottom edge, comprising:

- said edges surrounding the outer extremes of the door and the inner boundary of the central opening thereby forming a dam wall assembly,

- all of said dam walls assembly being formed by edge portions extending from each panel and integrally molded in said panels,

- each of said extending edge portion engaging an opposed overlapping means forming a hollow interior between the opposed panels,

- the dam wall assembly and hollow interior characterized by the absence of secondary stiles, rails, or other independent elements inserted interiorly of the hollow interior,

- and a foam filled interior essentially filling the hollow interior defined by the edges and adhesively securing the inner and outer panels to each other,

whereby the finished door has a foam filled core to fill the hollow interior, add to structural integrity, enhance the monocoque effect of the overall door structure, and adhere the inner and outer panels to each other.

5. A molded door frame having two frame panels, an outer panel and an inner panel, which panels are secured to each other by a foamed in place filling between the outer panel and the inner panel, the improvement comprising,

- side wall edges, a top wall edge, and a bottom wall edge on the inner door panel and the outer door panel defining outer edges;

- each of said edges overlappingly engaging the opposite edge;

- a window opening surrounded by side edges, top, and bottom edges defining inner edges and an open window area;

- said inner edges overlapping each other and defining an essentially hollow space between the inner and outer edge;

- all of said edges being formed integrally in said panels and extending from the panels; and

- means for receiving foam in the hollow space between the inner and outer edge in adhesive engagement between the outer panel and the inner panel and securing the two panels together in the absence of secondary securing means.

6. A door having an outer panel and an inner panel, comprising,

- side edges, a top edge and a bottom edge integral with each of said panels formed for interlockingly engaging the opposite side, top and bottom edges, of said outer and inner panels;

- further edges forming a window opening having interlocking engagement means for engaging the opposite panel;

- all of said edges forming a hollow interior between the panels, and

- a foam filled interior passing through the hollow interior between the panels in the absence of secondary independently formed securing means for securing the outer frame to the inner frame.

7. A method for forming a door having an outer panel, and an inner panel, said outer panel and inner panel each having outer side, top, and bottom edges, and an interior window opening having interior side, top, and bottom edges in each of said panels, said edges interlockingly engaging with the opposed edges,

- the step of securing said panels to each other by filling the hollow space between the panels and inner and outer edges with a foam in the absence of secondary independently formed and inserted securement means.

8. A door frame having an inner panel and outer panel, each panel having a central essentially rectangular opening for a window, said door frame having side edges, a top edge, and bottom edge, said central opening having side edges, a top edge, and a

bottom edge, all of said edges being integrally formed in said panels from which said edges extend from the panel, comprising;

- said outer edges forming a dam wall assembly surrounding the exterior periphery of the door and the central opening edges forming, with the outer edges, an essentially continuous unblocked hollow inside of the door panels,

- all of said edges being formed as a unitary one piece molded circumambient extension from the panels,

- each of said edges engaging the opposed edge in foam blocking relationship,

- the edges of the door also serving as the dam wall assembly in the absence of secondary stiles, rails, or other independent elements inserted interiorly of the essentially continuous rectilinear dammed uninterrupted and unblocked hollow space interiorly of the door,

- a continuous void for foam filling being defined by the circumambient side edges, top edge, and bottom edge for uninterrupted foam filling,

- and a foamed in place interior essentially filling the hollow space defined by the edges,

whereby the finished door has a uniform and unitary uninterrupted foamed in place core to fill the hollow space, add to structural integrity, enhance the monocoque effect of the overall door structure, and adhere the inner and outer skin to each other without the use of secondary mechanical assembly steps in the formation and filling of the interior hollow space by blocking the

escape of foam at the joints between the edges and permitting the foam access to the entire hollow space from any exterior location.

9. In the door according to Claim 8,

- outer and inner extensions into the window area to define overlapping opposed framing borders for receiving the window.

10. In the door according to Claim 8,

- said dam wall edge and window portion extensions from both the outer skin and the inner skin to overlappingly engage the opposed wall portions.

11. A door having an outer panel and an inner panel, each panel having a central opening for a window, said panels defining a door frame having side edges, a top edge, and bottom edge, said central opening having side edges, a top edge, and a bottom edge, comprising:

- said edges surrounding the outer extremes of the door and the inner boundary of the central opening thereby forming a circumambient dam wall assembly,

- all of said dam walls assembly being formed by edge portions extending circumambient from each panel and integrally molded in said panels,

- each of said extending edge portion engaging an opposed overlapping foam blocking means forming an uninterrupted hollow interior between the opposed panels,

- the dam wall assembly and hollow interior characterized by the absence of secondary stiles, rails, or other independent elements inserted interiorly of the hollow interior,

- an uninterrupted hollow interior surrounding the window edges and interior of the outer edges,

- and a foam filled uninterrupted interior essentially filling the hollow interior from any opening in the otherwise dammed hollow area defined by the edges and adhesively securing the inner and outer panels to each other,

whereby the finished door has a foam filled core to fill the hollow interior, add to structural integrity, enhance the monocoque effect of the overall door structure, and adhere the inner and outer panels to each other.

12. A molded door frame having two frame panels, an outer panel and an inner panel, which panels are secured to each other by a foamed in place filling between the outer panel and the inner panel, the improvement comprising,

- side wall edges, a top wall edge, and a bottom wall edge on the inner door panel and the outer door panel defining circumambient outer edges;

- each of said edges overlappingly engaging the opposite edge;

- a window opening surrounded by circumambient side edges, top, and bottom edges defining inner edges and an open window area;

- said inner edges overlapping each other and defining an essentially uninterrupted hollow space between the inner and outer edge;

- all of said edges being formed integrally in said panels and extending from the panels; and

- a continuous hollow void between the panels which is unblocked and open so that foam may flow freely in any direction in said hollow void,

whereby a continuous foam fill can occupy the hollow void and move into the entire hollow area without blockage and is surrounded by edges to adhesively secure the two frames together and to add strength to the structure and insulate the door.

13. A door having an outer panel and an inner panel, comprising,

- circumambient side edges, a top edge and a bottom edge integral with each of said panels formed for interlockingly engaging the opposite side, top and bottom edges of said outer and inner panels;

- further edges forming a window opening having interlocking engagement means for engaging the opposite panel;

- all of said edges forming an uninterrupted unblocked hollow interior between the panels, and

- a foam filled interior passing continuously without interruption through the hollow interior between the panels in the absence of secondary independently formed securing means for securing the outer frame to the inner frame;

whereby a door is formed with a foam filled interior, the foam for which is uninterrupted in its penetration of the entire hollow interior, and foam leakage is prevented by the interlocking engagement of the edges which prevent the seepage of blow-by experienced with a butt joint when foam is filled under pressure.

14. A method for forming a door having an outer panel, and an inner panel, said outer panel and inner panel each having outer side, top, and bottom edges, and an interior window opening having interior side, top, and bottom edges in each of said panels, said edges interlockingly engaging with the opposed edges,

- proportioning the edges to entirely and uninterruptedly circumambiate the exterior portion of the door and similarly to surround the interior window opening without interruptions in the hollow space so that foam can propagate throughout the entire hollow space without being blocked at any portion of the hollow space and seeping out a gap at the joint between the panels;

- forming a hollow interior in the door which is continuous and unblocked to thereby permit the uninterrupted and unblocked filling with foam,

- the further step of securing said panels to each other by filling the hollow space between the panels and inner and outer edges with a foam in the absence of secondary independently formed and inserted securement means.

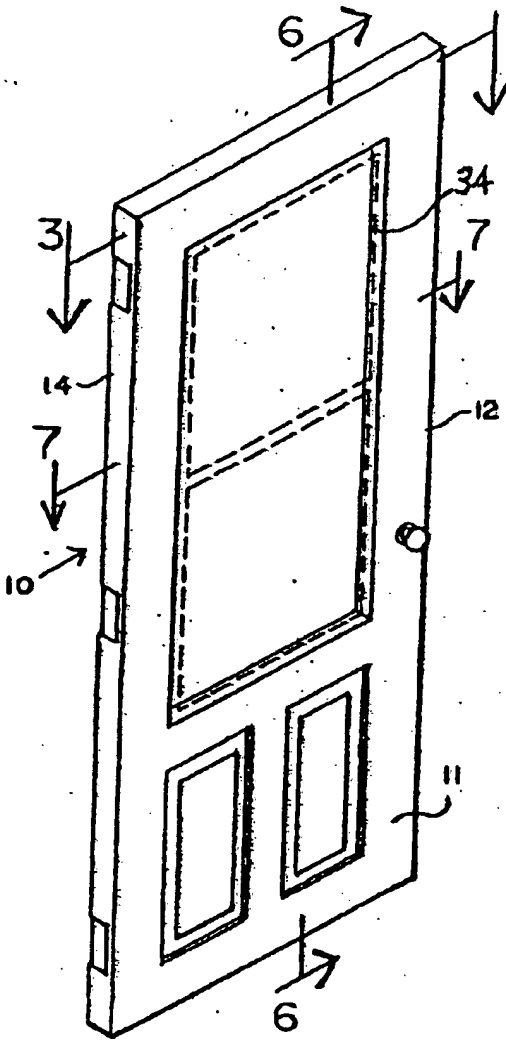


FIG.1

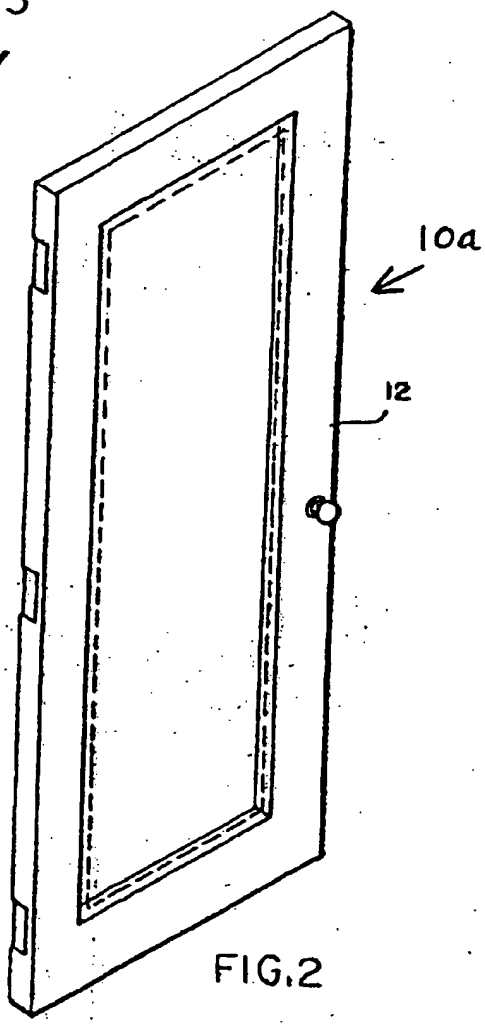


FIG.2

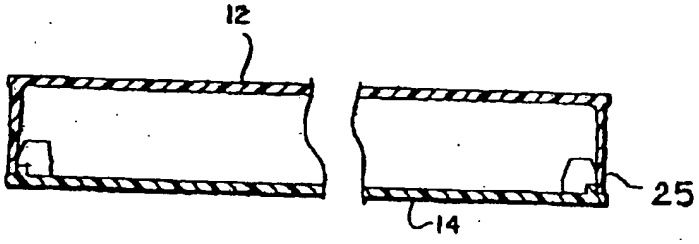


FIG.3

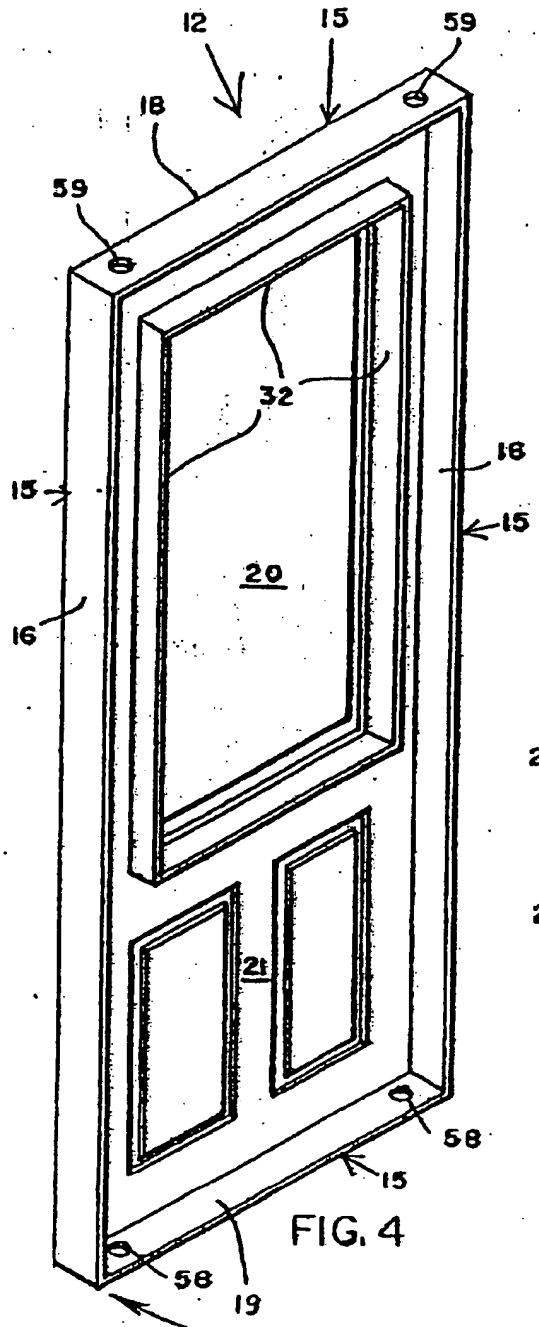

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FIG. 4

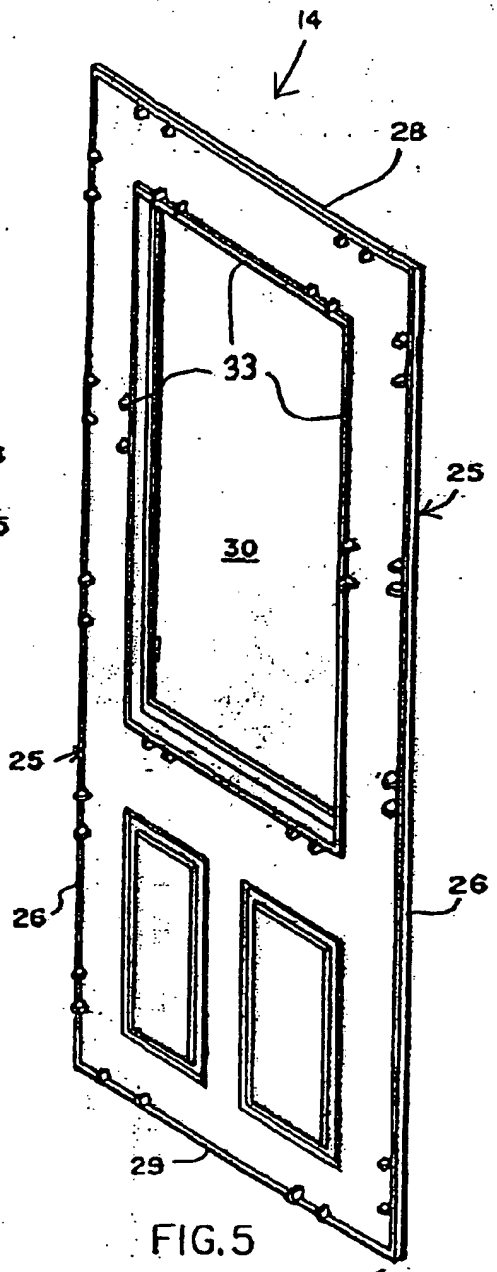
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FIG. 5

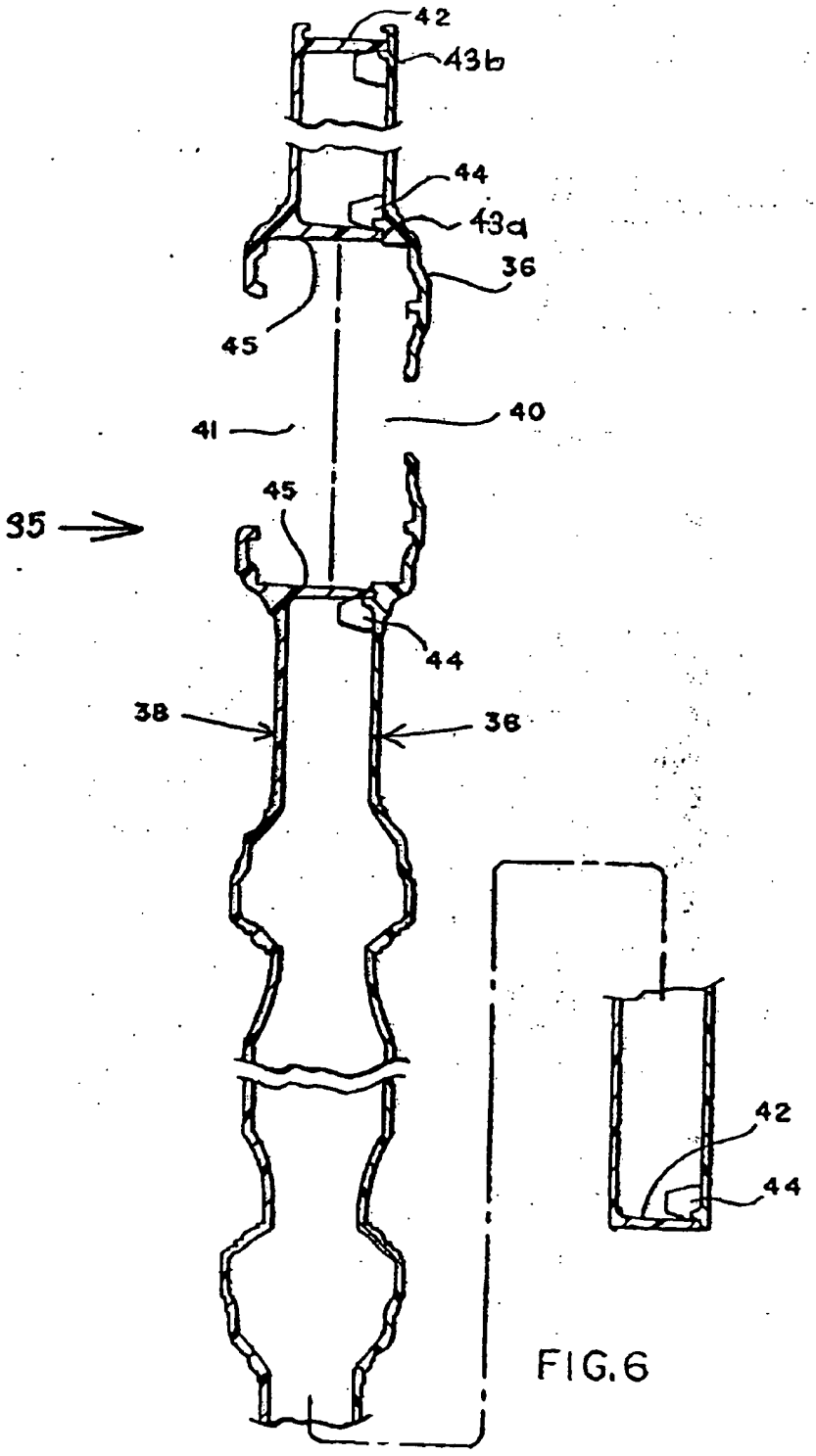

FIG.6

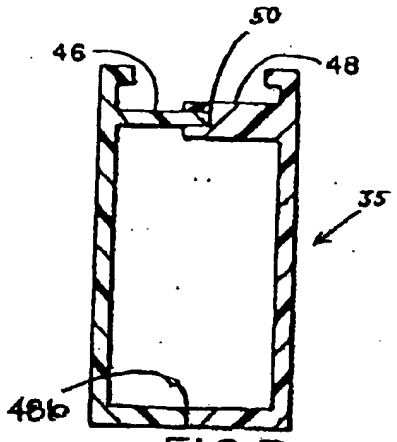

FIG. 7

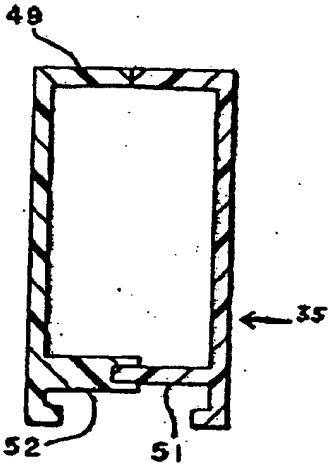

FIG. 8

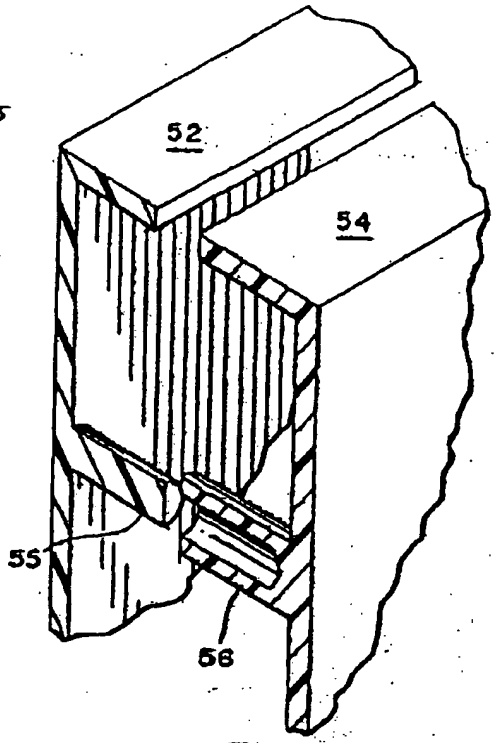

FIG. 9

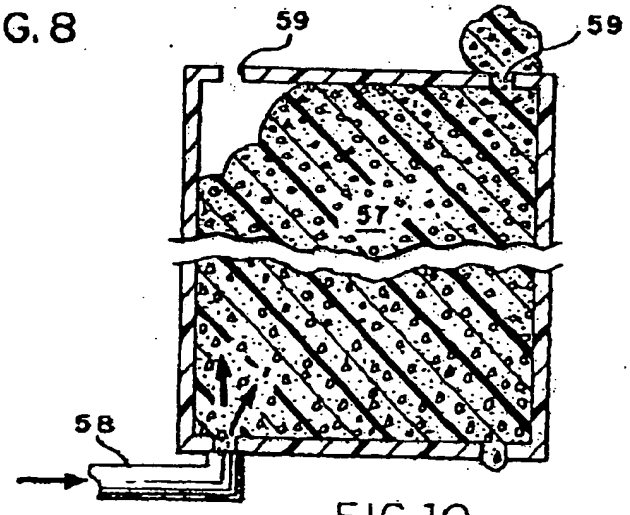

FIG. 10

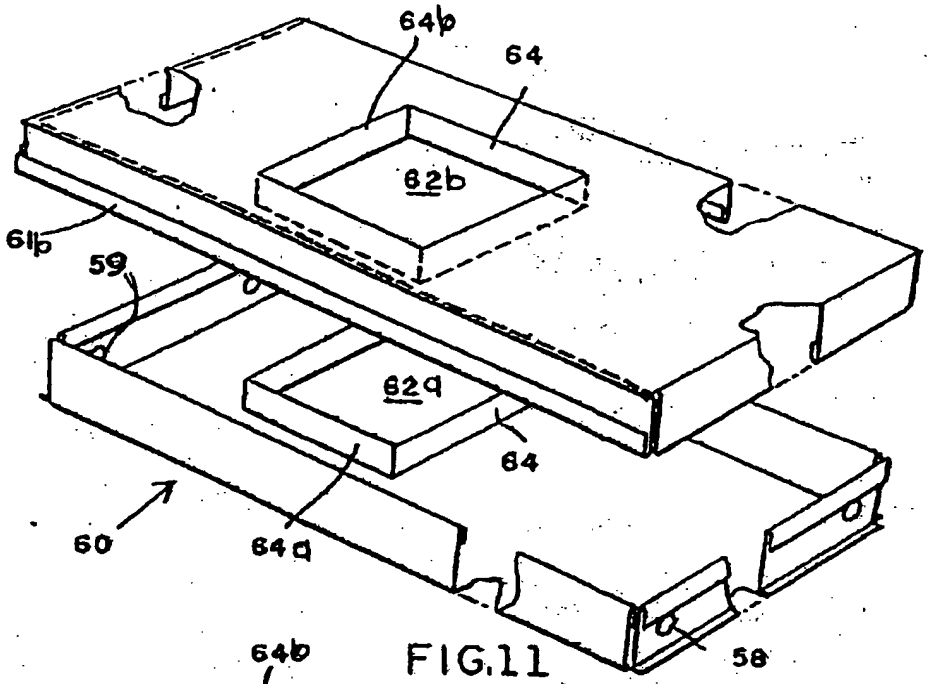

FIG.11

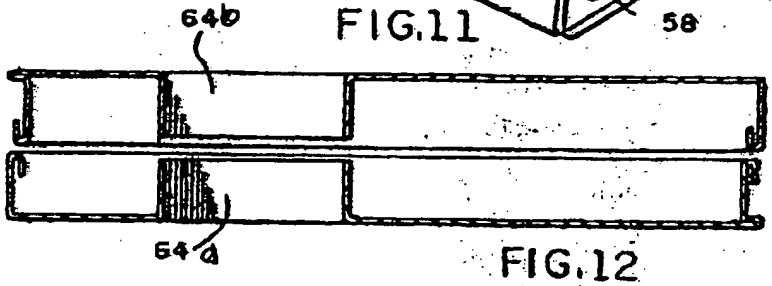

FIG.12

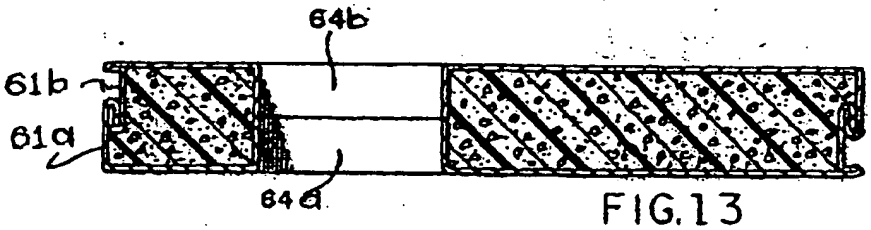

FIG.13

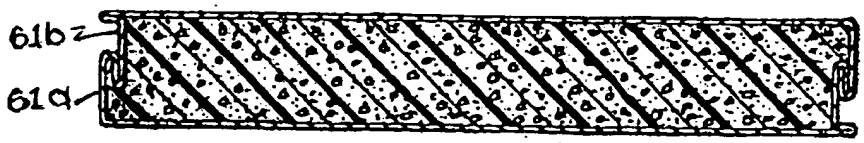

FIG.14